there is no urgent necessity it is better to wait. The dementia is sure to increase as time goes on, and a case which is difficult now may be easy enough to diagnose in six months' time.

THE GOULSTONIAN LECTURES ON THE SUPRARENAL BODIES.

Delivered before the Royal College of Physicians of London,

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LECTURE III.

THE NERVOUS THEORY OF ADDISON'S DISEASE.

THE experimental work of Phillipeaux, Harley, and Tizzoni point to the absence or unimportance of any function on the part of the suprarenal bodies. As already seen this negative view as to the functions of the suprarenal bodies held the field from Addison's discovery until quite recent times. On such a physiological basis the connection between disease of the suprarenal capsules and Addison's disease was explained by the secondary morbid changes, induced by the lesions in the suprarenal bodies, in the neighbouring semilunar ganglia, solar plexus, and sympathetic nerves. This conception will be for ever associated with the name of Dr. Samuel Wilks. It was based on *post-mortem* investigation showing the spread of inflammation from the tuberculous suprarenal bodies to the semilunar ganglia and other branches of the sympathetic.

Dr. Greenhow¹ inferred that at least all the more important features and prominent symptoms of the disease are due to morbid changes in the nerves, the changes in the nerves being (1) irritation and (2) atrophy. The collapse and the extreme state of debility are thus explained as the result of the altered condition of the sympathetic in the abdomen. The vomiting and pigmentation are referred to the direct irritation of the sympathetic by the caseous material in the suprarenal bodies, or from the same cause acting reflexly through the cerebro-spinal system.²

The view of Wilks and Greenhow may be summarised thus: The lesion is primary in the suprarenal bodies, and always of the same nature, while the symptoms of the disease are due to the secondary effect on the adjacent sympathetic, the solar plexus, and semilunar ganglia. Arnaud and Alexais³ accepted the principle, but by limiting the nervous changes to the ganglia in the fibrous capsule of the adrenal bodies they were able to explain the fact that in Addison's disease the solar plexus and semilunar ganglia may be healthy.

A natural modification of these views is that Addison's disease is due to changes in the abdominal ganglia and sympathetic, which may be due to disease of the suprarenal bodies, but is quite independent of a special, or indeed of any, lesion in them. This theory was supported by Jaccoud, von Kahlden, and others from the clinical and morbid anatomy point of view, and by the experimental researches of Tizzoni. Semmola⁴ carried this view to an extreme degree; he believed that not only had changes in the suprarenal bodies nothing to do with Addison's disease, but, when they did exist, that they were trophic lesions due to injury to the nerves which presided over their nutrition.

The nervous theory does not explain the numerous cases recorded of typical Addison's disease, in which special attention has been paid to the condition of the semilunar ganglia and adjacent sympathetic, and in which they have been found to be normal, since continued irritation could not last for any time without setting up inflammatory changes *in situ*. Still less does it explain the occurrence of the symptoms of Addison's disease associated with simple atrophy of the adrenal bodies. Apart from these facts, which by so directly contradicting the data of the theory put it out of court, there are considerable difficulties in the working of the theory. Some of the changes described as responsible for the disease have considerable resemblance to those normally found in adult life, that is, those in the semilunar ganglia. The changes in the sympathetic, etc., according to Greenhow, are

(1) irritative in the early stage, followed by (2) atrophic changes corresponding to two stages of the disease. The disease cannot be divided into an early stage showing symptoms the result of a discharging lesion, and a later with symptoms due to an atrophic change in the sympathetic. "Vomiting in advanced cases is seldom absent, and may be spontaneous and irrepressible." Convulsions not uncommonly occur shortly before death, and never in the earlier stage, when according to this view they would naturally be looked for. Pigmentation is nearly always a symptom occurring late in the course of the disease, whereas, according to the view that it is due to irritation of the sympathetic, it should always appear fairly early.

Dr. Bedford Fenwick⁵ has suggested that when the medulla of the suprarenal body is affected the constitutional symptoms result, and that when the lesion spreads to the cortex bronzing follows. This would explain the sequence of events, but it would also logically necessitate the constitutional symptoms of Addison's disease appearing whenever the medulla is affected, which is very far from being the case. Experimental removal of the coeliac plexus leads to rapid emaciation, low temperature, diminution in the amount of urea in the urine, acetoneuria,⁷ though this is disputed,⁸ and acetonaemic coma. These results do not support the view that Addison's disease is due to an irritating and destructive lesion of the sympathetic around the suprarenal bodies.

There are numerous examples of slow irritation of the abdominal sympathetic by enlarged glands, spinal caries, surgical and tuberculous kidney, abdominal aneurysm, and chronic peritonitis, where there are no symptoms of Addison's disease, except perhaps some pigmentation. Although it is the sign by which this disease is perhaps most often recognised, the bronzing is not only variable in degree and late in appearing, but is also met with in other diseases, as in exophthalmic goitre.

Now, since in exophthalmic goitre changes in the sympathetic have been described, it might be thought that there are analogies between it and Addison's disease. It may then be well briefly to consider this point. Professor Greenfield⁹ in his Bradshaw lecture showed that exophthalmic goitre is associated with subacute inflammation of the pons, medulla, and parts of the sympathetic, and ascribed these changes to excess or alteration of the internal secretion of the thyroid gland.

Addison's disease and exophthalmic goitre differ very considerably in the clinical picture they present; but they have, though far from constantly, two classes of symptoms in common, namely, gastro-intestinal disturbance and anomalies of pigmentation. Supposing that these common symptoms are both connected with irritation of the nervous system, the conditions are not fairly analogous. For according to the nervous theory of Addison's disease the irritation is simple, and due to the extension of chronic inflammation to the abdominal sympathetic, while in exophthalmic goitre the changes and irritation of the nervous system constitute only half the morbid factors present. In addition there is probably a poison present which, independently of the nervous changes it produces, may very well be capable of producing textural lesions and functional disorders. In other words, a consideration of exophthalmic goitre does not lend any support to the purely nervous theory of Addison's disease. As has been already seen, the nervous theory is untenable, since the sympathetic in the neighbourhood of the suprarenal bodies is not constantly altered.

THEORY OF SUPRARENAL INADEQUACY.

Since the nervous theory does not explain Addison's disease, the rival theory of suprarenal inadequacy must be examined. This theory assumes that the suprarenal bodies are active glands, and that interference with their functions gives rise to Addison's disease.

Since the morbid symptoms are connected with some change in the constitution of the blood, this theory might, on contradistinction to the nervous theory, be called the chemical theory of Addison's disease.

In the foregoing sketch of the physiology, the suprarenal bodies were shown to be functional glands, but discussion of the nature of this function was postponed. The two views as to their physiology were:

1. That the suprarenal bodies are excretory or katabolic in function. That they pick up and remove from the circulation effete blood pigment and toxic bodies, and destroy them.

2. That these organs are secretory or anabolic. That they manufacture some fluid which passes into the blood vessels or lymphatics, and is of use in the economy.

Before discussing which of these theories is correct, three questions must be considered :

(1) How do the facts of morbid anatomy bear on the hypothesis that Addison's disease is due to the loss of function of the adrenal bodies?

(2) Is the disease likely to be a toxæmia?

(3) Can the symptoms of the disease be explained on this hypothesis?

I.—BEARINGS OF MORBID ANATOMY ON THEORY OF ADRENAL INADEQUACY.

It is known that destructive tuberculous lesions and atrophy of the suprarenal bodies may give rise to the symptoms of Addison's disease.

But the following objections may be raised to the theory of suprarenal inadequacy:—

1. The existence of cases where *post mortem* the suprarenal bodies are found to be extensively destroyed by tubercle or new growth, and in which definite clinical symptoms of Addison's disease have been absent during life. 2. Secondly, that there are cases clinically of Addison's disease in which *post-mortem* caseation of comparatively small amount is found in the suprarenal capsules—perhaps only in one—and in which the amount of damage is even less than in cases which have presented no sign of Addison's disease. Since a comparatively small part of the available suprarenal substance is thus rendered functionless, it has been argued that the concomitant symptoms cannot be due to abolition of the function of the organs. And (3), lastly, that there are examples of Addison's disease in which the suprarenal capsules themselves are healthy, though the surrounding sympathetic nerve plexuses and semilunar ganglia are involved in dense adhesions or by a growth, such as lymphadenoma.

In reply to these the following considerations may be brought forward:

1. In cases where the organs are extensively destroyed by tubercle or invaded by new growth the absence of symptoms may be explained in two ways: (a) The change in the adrenal bodies is usually a secondary result of advanced disease in other organs, which has killed the patient before the symptoms of Addison's disease, usually a chronic affection, have had time to develop. (b) That some compensation for the destruction of the suprarenal glands is present in accessory suprarenal bodies, and that, as in the case of the thyroid gland, symptoms due to the destruction of the main glands are thus avoided.

2. In reply to the objection that when the lesion of the suprarenal substance is not of considerable amount the remaining part of the organ, if healthy, should produce compensation, and thus prevent the development of symptoms, it may be urged that failure in this power of compensation may be due to inherent want of vitality, to concomitant atrophy, or possibly—and this is a point requiring investigation—to the tuberculous growth interfering with the efferent vessels. The common tuberculous caseous change always begins in the medulla, and thus might easily obstruct the vascular connections of the organ, and so render it functionless, even though there was a sufficiency of secreting gland tissue left.

3. In the few cases of Addison's disease, where the suprarenal bodies are described as healthy, while the sympathetic and semilunar ganglia were involved in dense adhesions or in a growth, it is possible that the vessels and lymphatics of the suprarenal capsules were thus interfered with, and so the organs were placed outside the circulation and rendered functionless. The sequence of events, then, may be compared to Boinet's experimental ligature of the pedicle (and veins) of the suprarenal bodies, with its resulting fatal toxic effects. Hence it may be concluded that obstruction to the efferent vessels of the suprarenal capsules is quite a possible cause of Addison's disease. The facts of morbid anatomy, then, appear to be compatible with the view that Addison's disease can be explained by suprarenal inadequacy.

II.—IS ADDISON'S DISEASE LIKELY TO BE A CHRONIC TOXÆMIA?

Addison's disease and myxœdema are in many ways analogous. The destruction of the thyroid gland or its experimental removal leads to a train of symptoms—myxœdema—which can be satisfactorily obviated by artificially supplying the organism with the extract of the thyroid. The same is probably true of the suprarenal bodies.

In myxœdema the cause of the symptoms might be (1) a toxic condition of the blood due to the suspended secretion of the thyroid gland, or (2) a condition of general apathy of the nervous system from the absence of its normal stimulus provided by the secretion of the thyroid gland.

According to the general view myxœdema is due to the absence of thyroid secretion causing a loss of functional activity on the part of the tissues, on which, in all probability, the accumulation of mucin depends. Possibly some toxic body accumulates in a similar manner to mucin, and exerts a poisonous action on the central nervous system. In support of this the toxicity of the urine has been found to be increased by thyroidectomy, the curve of the toxicity varying with the morbid symptoms.¹⁰ In experimental removal of the suprarenal bodies the blood acquires a toxic property, as shown by its effect on other animals.¹¹

The extreme debility and languor of Addison's disease, with the periodic exacerbations in the progress of the disease, are very like the same events in pernicious anæmia. The phenomena of pernicious anæmia are best explained by the view that absorption of toxic bodies occurs in the portal system.

Addison's disease and uræmia present certain analogies. In both there is a combination of symptoms suggesting paralysing and irritating factors at work—the drowsiness and not infrequent paralysis of uræmia and the extreme languor and occasional convulsions before death in Addison's disease.

Bouchard has found that in normal urine there are seven toxic bodies. In uræmia these poisons are retained in the body, and the urine is harmless. Now in Addison's disease, since the kidneys are nearly always healthy, the toxic bodies need not be retained in the body, and so might be found in the urine. It is therefore a point urgently requiring investigation as to whether the urine in Addison's disease is more toxic than in health, and what are the results obtained by injecting it into animals as compared with Bouchard's results with healthy urine. The solution of this problem would go far to settle the question whether Addison's disease is a chronic toxæmia.

Quite recently Schäfer and Oliver¹² have found that extracts from the urine of patients with Addison's disease, when injected into animals, have the same effect as normal urine. This observation they regard as being important evidence that the suprarenal bodies do not excrete poisons, but it also militates against the view that Addison's disease is a toxæmia.

From analogy and from the toxic condition of the blood in animals deprived of their suprarenal bodies it would seem probable that Addison's disease is a toxic condition, but the absence of special toxic bodies from the urine is strongly against this view. Further experiments are required, and for the present the question as to whether Addison's disease is or is not a toxic condition should be left open.

III.—ON THE ASSUMPTION THAT ADDISON'S DISEASE MIGHT BE A CHRONIC TOXÆMIA, CAN ITS SYMPTOMS BE EXPLAINED ON SUCH A HYPOTHESIS?

The extreme debility might be due to a toxin possessed of properties like those of curare. Since, however, suprarenal extract has marked toxic effects, it might well be argued that its absence fully accounted for the extreme debility and languor of Addison's disease, and that it was quite unnecessary to invoke a hypothetical toxin for this purpose. Experimentally, however, the injection of blood from acapsulated animals into others gives rise to a temporary condition of extreme languor; so it is not unreasonable to consider this phenomenon in the human subject as possibly due to the presence of a toxin having an action like that of curare.

The gastro-intestinal symptoms might well be due to the effects of a toxin exerting an irritating effect on the central and visceral nervous systems. Pigmentation might be the

result of the constant influence of a toxic substance on the sympathetic nervous system. A similar explanation accounts for pigmentation in exophthalmic goitre. The influence of the nervous system on pigmentation of the skin, though not proved physiologically, is extremely probable from clinical observations.

The increased pigmentation is an exaggeration of the normal, and the influence of the sympathetic is probably exerted by altering the condition of the vessel wall, and so allowing increased transference of pigment by the carrier cells to the epidermis. But it must be remembered that there is the hypothesis that stimulation of the sympathetic nerve fibres increases an active formation of pigment by the cells of the stratum Malpighii. The existence of chromatogenic nerve fibres¹³ has been suggested, but cannot be considered to have been proved.

The extreme debility may be considered either as a result of a toxic condition or as a state of atony due to the absence of a necessary stimulus. The vomiting, gastro-intestinal disturbances, and pigmentation point to there being some positive irritation rather than to a mere absence of a normal stimulus. On the whole, the symptoms of Addison's disease are better explained as the result of a toxæmia than on the supposition that they are solely due to the absence of the stimulus normally provided by the internal secretion of the adrenals to the body generally.

Having seen that the facts of morbid anatomy are compatible with the view that Addison's disease is due to inadequacy of the suprarenal bodies, and that it is an open question whether Addison's disease is due to a toxic or to an atonic condition, let us examine the two theories as to the function of the suprarenal bodies.

THE THEORY THAT THE SUPRARENAL BODIES REMOVE PIGMENT AND TOXIC SUBSTANCES FROM THE BLOOD.

What evidence is there that blood pigment undergoes any change in the suprarenal bodies?

The hæmoglobin is freed from the red blood corpuscles chiefly in the spleen, and possibly to some extent in the red marrow of bone,¹⁴ but the former is the important seat of this change, otherwise hæmoglobin would appear in the urine. The katabolic changes undergone by hæmoglobin take place in the liver.¹⁴

MacMunn's view is that the suprarenal capsules perform this function, and that when they are destroyed an accumulation of effete pigment occurs in the circulation. No such accumulation of solid pigment has ever been found in the blood in Addison's disease. Brown-Séquard and Boinet are the only observers who have ever recorded pigment granules in the blood after experimental removal of the suprarenal capsules. In animals killed by toluylene diamine, Pilliett¹⁵ noticed products of blood destruction in the medulla of the suprarenal capsules giving rise to pigmentation, but this poison produces hæmolytic so freely that this observation lends no support to the view that normally any changes occur in the medulla of the suprarenal bodies.

But it might be argued that, even if there is no solid pigment free in the blood, there might be an increased amount of soluble pigment or chromogens in the circulation as the result of destruction of, or interference with, the suprarenal capsules. Such an excess of soluble pigment might be thought to provide the cells of the stratum Malpighii with satisfactory pabulum for pigment formation. But such soluble pigment should pass freely into the urine. Is there any evidence of such increase of urinary pigments in Addison's disease? Thudichum,¹⁶ in a continuous examination for sixty-five days of the urine of a case of Addison's disease found a deficiency in the colouring matters. A similar result was obtained by Dr. A. E. Garrod, who most kindly made some analyses of the urine of a case of Addison's disease for me, and by Dixon Mann.¹⁷

MacMunn based his theory on the belief that hæmoglobin and histohæmatins become changed into hæmochromogen, histohæmatins being found by him in the cortex, and hæmochromogen in the medulla of the suprarenal capsule. Hæmochromogen, according to this author, is blood pigment in an excretory stage, and is also found in the bile. In Addison's disease the interference with this pigment-metabolising function of the suprarenal bodies was shown by the presence of a

pigment, urohæmatoporphyrin, in the urine. He found this body, however, in the urine of diseases such as enteric fever, measles, cirrhosis, meningitis,¹⁸ etc., in which the suprarenal capsules are not specially affected. In addition it has been shown that urohæmatoporphyrin is not a definite chemical compound, but a mixture of a larger quantity of hæmatoporphyrin and a smaller quantity of urobilin,¹⁹ both of which are among the normal urinary pigments.²⁰ Garrod²¹ has found hæmatoporphyrin in considerable quantities in the urine of tuberculous subjects, and, since Addison's disease is usually tuberculous, an increased amount of hæmatoporphyrin, if present, would be thus accounted for.

As shown above, the urinary pigments are not increased in Addison's disease, and hæmatoporphyrin in the analysis Garrod kindly did for me was only present as a trace. Even if hæmatoporphyrin were present uniformly in large quantities in Addison's disease this would prove little, since it has been shown to occur in considerable amounts in such various conditions and diseases as sulphonal poisoning,²² gout,²³ chorea,²⁴ phthisis, and pneumonia, and not to be increased in pernicious anæmia. Indican has been found in the urine in increased quantities in Addison's disease, but its presence is a sign of intestinal disturbance, and points possibly to an auto-intoxication, but not to any change in metabolism of the pigments of the blood. From these considerations it appears highly improbable that the suprarenal bodies have any action on the effete pigments of the blood.

What evidence is there that in the suprarenal capsules poisonous bodies are destroyed or rendered innocuous? On removal of these organs the animals die, and their blood, when injected into healthy animals, gives rise to symptoms resembling those seen after removal. This toxic property of the blood might be due to non-excretion on the part of the suprarenal bodies, or to their internal secretion no longer neutralising this toxic property of the blood.

Now, Tizzoni²⁵ and Nothnagel²⁶ crushed the suprarenals, and left them to be absorbed *in situ*, without any signs of toxæmia resulting. If, therefore, the former alternative be set up as a hypothesis, at any rate the suprarenal bodies do not contain the poisonous substances which they might be supposed to remove. This same hypothesis is further opposed by the experiments of Abelous and Langlois.²⁷ They showed that the toxæmia due to ablation of the organs can be counteracted by injection of suprarenal extract. Now, if the suprarenal bodies excreted a poison, which when accumulating in the blood gives rise to toxic symptoms, injection of suprarenal extract would only increase these toxic effects.

These two observations, then, are both opposed to the hypothesis that the suprarenal bodies excrete a poisonous substance. On the other hand, it is known²⁸ that injection of very large quantities of suprarenal extract, equal to several times the weight of the suprarenal bodies, produces death.

At first sight this might seem to tend in the opposite direction, but it does not really do so. It only proves that an abnormal and poisonous dose of suprarenal extract or secretion has been used.

Again, Abelous and Langlois²⁹ showed that after removal of the suprarenal bodies a toxic body with properties like curare appeared in the blood. But, on the other hand, Schäfer and Oliver found that the effect of suprarenal extract was not at all comparable to that of curare.

These two experiments are not contradictory; they only show that the body or bodies extracted from the suprarenal capsules are not the same as those present in the blood of animals whose adrenals have been removed. This is a strong argument against the theory that the suprarenal bodies are excretory glands.

There is, then, evidence, that the suprarenal bodies do not remove effete blood pigment from the blood or absorb toxic bodies and render them harmless.

THEORY THAT ADDISON'S DISEASE IS DUE TO AN INADEQUATE SECRETION ON THE PART OF THE SUPRARENAL BODIES.

Since the function of the suprarenal bodies is not excretory we are left with the alternative view that they are secretory glands providing an internal secretion like the thyroid. The researches of Abelous and Langlois³⁰ and of Schäfer and Oliver³¹ form the basis for this belief.

* Schäfer and Oliver³² lately showed that healthy human suprarenal capsules yield a powerful extract, but that in cases of Addison's disease no active extract can be obtained. This points strongly to the conclusion that Addison's disease is due to arrest of secretion of the suprarenal bodies.

In seeking for an explanation of the phenomena of Addison's disease in a cessation of the secretory function of the suprarenal bodies the next step is to inquire whether the facts available point (1) to this secretion directly antagonising a poison which is continually being formed in the body. This antagonism might be conceived of (a) as occurring in a manner analogous to the neutralisation of an acid by an alkali, or (b) as being due to the secretion exerting a ferment-like action on these hypothetical toxins and destroying them. Or (2) to the secretion acting as a stimulus to the various tissues of the body. This tonic effect on the tissues might act conceivably in three ways: (a) by regulating their nutrition and activity; in the absence of this restraining influence, the tissues, so to speak, run riot, and might even produce toxic bodies.³³ (b) By increasing the resistance and defensive powers of the cells of the body, including the white blood corpuscles, so that they are able to withstand the poisonous bodies possibly resulting from the general metabolism of the body, and to destroy them. (c) By increasing their functional activity without any reference to the presence of toxic bodies.

Schäfer and Oliver's³¹ experiments show that suprarenal extract has a very definite effect on healthy animals, being among other things, a powerful vascular tonic. This observation proves that the secretion is not merely a chemical antidote.

In order to prove whether suprarenal extract or secretion has any such neutralising action on the toxic bodies in the blood of animals deprived of their suprarenal bodies, experiments should be performed on the lines of Buchner's³⁵ experiment with antitoxin. Guinea pigs are twenty times more susceptible to tetanus than white mice. A mixture of tetanus toxin and antitoxin was prepared so that no effect followed its injection into white mice, but when tried on guinea-pigs a fatal result was produced. So the immunity conferred by antitoxin is not due to a mere neutralisation, but to the effects of antitoxins on the tissues. Suprarenal extract should, like antitoxin, be mixed with toxic blood from animals dying from ablation of the suprarenal bodies, and the point be settled whether the amount of suprarenal extract required to counteract the accompanying toxins is the same for all animals, in which case it would appear to be a process of neutralisation, or whether it varies with the susceptibility of different animals.

With regard to the possibility of the suprarenal extract containing a ferment which destroys hypothetical toxins in the blood, it must be borne in mind that such a ferment would be destroyed by boiling. One of the extracts employed by Schäfer and Oliver was made with boiling water. Mere boiling does not affect the action of the extract, but continued boiling abolishes its activity. It is probable, therefore, that the active principle is not of the nature of a ferment; its action is not limited to the neutralisation of a poison in the blood. It certainly has direct stimulating powers on the tissues, as shown by Schäfer's and Oliver's experiments. It is tempting to jump to the conclusion that its curative properties are due to stimulation of the tissues, including the white corpuscles, and to increased defensive activity on their part; but at the present time there is not enough evidence to warrant any definite opinion.

To sum up, Addison's disease is due to an inadequate supply of suprarenal secretion. Whether the deficiency in this internal secretion leads to a toxic condition of the blood, or to a general atony and apathy, is a question which must remain open.

TREATMENT.

In conclusion, a few words about the treatment of Addison's disease by suprarenal extract will not be out of place, since such a course of treatment is the logical outcome of a belief in the view that Addison's disease is due to an absence of the

internal secretion of the suprarenal bodies. But few observations have been published. Dr. G. Oliver³⁶ treated two cases for three months with suprarenal extract by the mouth; they improved, in that they gained weight, became less pigmented, and were freed from nausea and anorexia.

I have had a woman with Addison's disease under treatment at St. George's Hospital since June, 1894. She is stronger and less subject to nausea and vomiting since taking suprarenal extract by the mouth; and though still pigmented is on the whole decidedly better. The quantity of the extract that should be given is a point which it is important to ascertain, otherwise disappointment may result because inadequate doses are employed; a dose equal to 45 grains of the original gland spread over the twenty-four hours is certainly not too much. Since each suprarenal capsule of a man weighs about 1 drachm, and since the medulla is the only part containing the active principle, this dose is nearly equal to two suprarenal bodies a day.

Dr. T. Oliver³⁷ mentions hypodermic injections of suprarenal extract; but the treatment was not given a fair trial, as the patient did not remain under observation. A more extended course of subcutaneous injection by Chauffard³⁸ was also unsuccessful.

Sir D. Duckworth, in an article in the *Encyclopædia of Medicine*, New York—the proofs of which he has most kindly allowed me to see—quotes a case of Sir T. Grainger Stewart's, in which feeding with the suprarenal bodies produced no good effect.

Dr. G. Oliver's and Professor Schäfer's physiological experiments suggested the use of the extract as a hæmostatic agent. The remedy is on its trial, and will probably, like thyroid extract, be found to be useful in diseases other than that for which it was first employed.

Since the action of suprarenal extract on the vascular system is the reverse of that of thyroid extract, Dr. G. Oliver has suggested its use in exophthalmic goitre. Inasmuch as the extract has such an extreme power of constricting the vessels, Dr. Oliver thinks it may be useful as a hæmostatic in purpura, hæmophilia, etc., and in the various conditions of vasomotor relaxation and paresis, such as occur at the menopause, in "cyclic" albuminuria, and in diabetes.³⁹ Possibly it might be useful in cases of shock and collapse. Dr. Douglas Stanley⁴⁰ has found that it increases the number of red blood corpuscles in pernicious anæmia. Oliver and Schäfer⁴¹ have found that suprarenal extract is not damaged by artificial gastric digestion, so that giving the drug by the mouth is physiologically correct.

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HEALTHY HOMES.—A series of popular lectures on this subject has lately been given at Lowestoft by Dr. Clark, medical officer of health for that borough. The evils of overcrowding and the various sanitary deficiencies common in houses were pointed out, and reference was also made to the advantage of periodical inspection of school children and to various other matters bearing upon sanitation.

SUCCESSFUL VACCINATION.—Mr. Wm. Donaldson, Public Vaccinator for the St. Mary Cray District, has been awarded for the second time the Government grant for efficient vaccination.

* I take this opportunity of thanking them for the generous manner with which they have put me in possession of the contents of their communication to the Physiological Society on March 16th, 1895, before the publication of that paper.